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# Highlands Center

Cape Cod National Seashore  
North Truro, Massachusetts

## BUILDING REHABILITATION and DEMOLITION ANALYSIS

Title I Facilities Planning

Task Order 13B

July 10, 2001



**Architects:** Bargmann Hendrie + Archetype  
316 Summer Street  
Boston, MA 12210-1710

**Environmental Services:** Vanasse Hangen Brustlin, Inc.  
101 Walnut Street  
Watertown, MA 02471-915  
(with Smith & Wessel Associates)

**Structural Engineers:** Aberjona Engineering, Inc.  
One Mount Vernon Street  
Winchester, MA 01890

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# **I. General Overview**

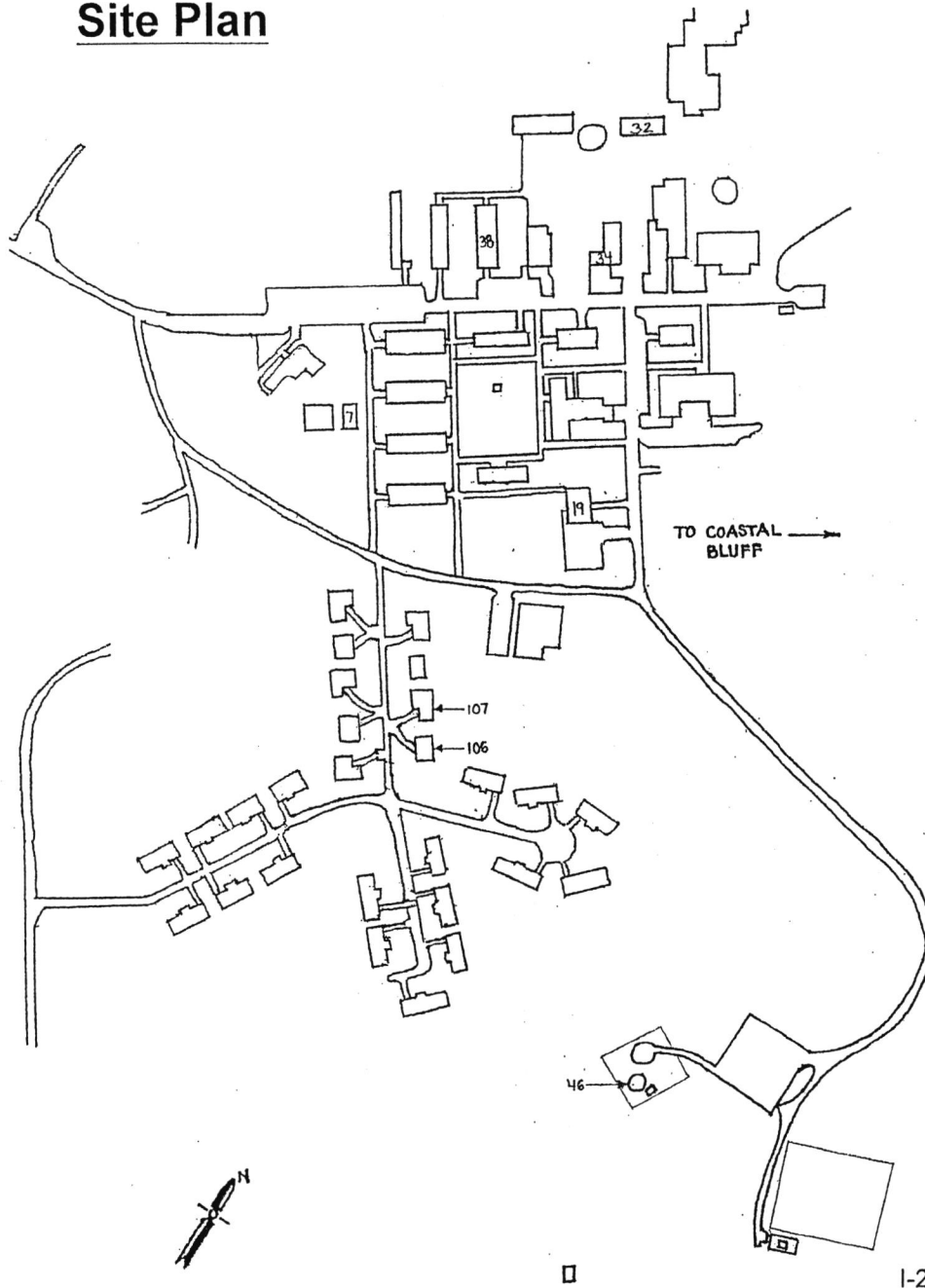
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## **Executive Summary**

We were retained by the National Park Service, Boston Support Office (NPS-BSO) and Cape Cod National Seashore (CACO) to determine rehabilitation and demolition feasibility for a representative sampling of buildings at the former North Truro Air Force Station, now part of Cape Cod National Seashore. The proposed use for this site is an education, research and conference facility to be known as the Highlands Center for the Arts and Environment. This study reports on our inspection and evaluation of eight buildings and references upgrades that will be necessary for the buildings designated to be rehabilitated for continued use. Prepared in a building-by-building worksheet format, the assessment includes detailed backup materials.

The report contains recommendations and cost estimates regarding building repair and upgrade, including hazardous materials abatement. Geared toward a successful Highlands Center reuse scenario intended to be both realistic and open-minded, our findings envision retention of all of the study buildings slated for reuse and proper demolition of those not to be reused.

## Site Plan



## List of Buildings Surveyed

- Building # 7 – Water Treatment Plant
- Building # 19 – Heating Plant
- Building # 32 – Office / Storage
- Building # 34 – Supply / Shop Storage
- Building # 38 – Dormitory
- Building # 46 – Wastewater Treatment Plant
- Building # 106 – Residence
- Building # 107 – Residence

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## **II. Architectural Overview**

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## Architectural Overview

### Introduction

The architectural and structural observation and assessment of the subject Highlands Center buildings followed review of materials provided to the A/E by the National Park Service (NPS) and coincided roughly with the hazardous materials ("hazmat") reviews. Using a custom-designed worksheet format created prior to the fieldwork, team members proceeded to investigate the structures, verifying or correcting data transcribed from earlier reports wherever possible.

Measured, diagrammatic floor and roof plans were provided to illustrate construction techniques and locate problem areas, and are included.

### Assumptions

1. Construction dates for existing Highlands Center buildings are as listed in earlier reports provided by NPS; no historical research was undertaken as part of the Building Condition Assessment work.
2. Observing and entering building interiors and crawl spaces and accessing roofs where possible, the architectural and structural review teams relied mostly on visual inspections. Estimated quantities related to required repair and replacement assume a certain extent of concealed conditions based on prior experience.
3. Although exposed architectural elements potentially containing hazardous materials were observed in the course of the architectural review, no hazmat assessments were performed by the architectural/structural teams. Sampling was conducted by the hazmat team; refer to environmental assessments and estimates.
4. Assumption is made that the buildings to be reused will be upgraded to meet the provisions for new construction of Massachusetts State Building Code, 6<sup>th</sup> Edition, 780 CMR, except in those instances where Article 34 provides relief.

### Typical Architectural/Structural Items

1. Field investigations included accessible building attics and crawl space; framing systems are noted on dimensioned plan diagrams. Area estimates for repair and replacement of concealed framing and sheathing are approximate and based on the condition of the adjacent interior and exterior finish materials.
2. Areas of specific water damage are noted in the building survey reports.
3. Other than isolated areas of rotted trim, no insect infestation was observed. Overall, structural framing was observed to be in good-to-excellent condition – owing, probably, to adequate natural ventilation and sandy soil conditions.
4. Architectural work items include cutting and patching allowances, as well as general interior cleanout and mildew treatments.
5. New floor, wall and ceiling finishes throughout the buildings to be reused are assumed, as are repair and/or replacement and painting of all interior doors and trim.
6. New and refurbished doors shall have accessible lever hardware.

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### **III. Environmental Pre-Demolition Audit Overview**

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December 20, 2000

Ref: 07394

Mr. Jack Glassman, AIA  
Bargmann Hendrie + Archetype  
316 Summer Street, Second Floor  
Boston, Massachusetts  
02210-1710

Re: Pre-Demolition Audits  
ACM, LBP, and OHM  
8 Buildings  
North Truro Air Force Station  
North Truro, MA  
BH+A Project No. 2226.00

Dear Mr. Glassman:

In accordance with our letter proposal dated November 14, 2000 Vanasse Hangen Brustlin, Inc. (VHB) and Smith & Wessel Associates, Inc. (S&W), conducted pre-demolition building audits at 8 vacant buildings located at the former North Truro Air Force Station (AFS) to identify the following:

- Asbestos-containing materials (ACM);
- Building materials coated with Lead-Based Paint (LBP);
- Items which contain Polychlorinated Biphenyls (PCBs);
- Mercury-containing lamps/tubes/thermostats;
- Appliances and refrigeration equipment which contain chlorofluorocarbons (CFCs); and
- Miscellaneous containers of oil and other hazardous materials (OHM).

This report is subject to the terms and conditions of the agreement between VHB and Bargmann Hendrie + Archetype (BH+A) and the attached Limitations (Attachment A).

Mr. Tim Downey of VHB, Mr. Glenn Nelson and Mr. Dan Smith of S&W performed the survey on November 15 & 16, 2000. Mr. Nelson and Mr. Smith are certified by the Commonwealth of Massachusetts Department of Labor and Workforce Development as Asbestos Inspectors and Management Planners (Certifications #AI30052, #AP30053 and #AI30136 and #AP30117). Because no buildings are occupied dwellings

with a child under the age of 6 years or a day care facility, the Commonwealth of Massachusetts Department of Public Health requires no accreditation to perform a survey for surfaces coated with LBP. No accreditations are required in the Commonwealth of Massachusetts to perform inspections for PCBs or mercury-containing lamps/tubes or appliances equipment containing CFCs.

The survey was limited to eight (8) buildings at the Site. The following 8 buildings were included in the scope of work for this survey:

- Building #7 – Water Treatment Plant
- Building #19 – Heating Plant
- Building #32 – Storage
- Building #34 – Storage/HazMat Virgin Drum Storage
- Building #38 – Dormitory
- Building #46 – Wastewater Treatment Plant
- Building #106 - House
- Building #107 – House

#### ASBESTOS-CONTAINING MATERIALS (ACM)

The inspection for suspect asbestos-containing materials (ACM) was conducted by Smith & Wessel Associates, Inc. in general accordance with guidelines published by the Environmental Protection Agency (EPA) Title 40 CFR, Part 763, Subpart E (AHERA) and 40 CFR Part 61, Subpart M (NESHAPS). Sampling procedures included the collection of at least two samples of all identified suspect homogeneous friable (easily crumbled or crushed to powder by hand pressure) and non-friable materials from each building surveyed. The survey for suspect ACM consisted of visual inspection, sampling and laboratory analyses. Destructive sampling and investigation activities, including roof sampling, were performed as part of the survey, as agreed by the NPS, to gain a more comprehensive sampling.

Sample analyses were performed at the SciLab Boston, Inc. laboratory located in Weymouth, Massachusetts. Bulk sample analysis was performed using Polarized Light Microscopy with Dispersion Staining (PLM/DS) in accordance with EPA protocol (Title 40 CFR, Part "Interim Method for the Determination of Asbestos in Bulk Insulation Samples", October, 1987).

A total of 156 samples of suspect ACM were collected and submitted for laboratory analyses of which 126 samples were analyzed. Samples were collected from the following materials:

- Cementitious exterior siding shingles (transite);
- Sheet rock wall boards and associated joint compounds;
- Linoleums;
- Floor tiles and associated mastic adhesives;

- Asphalt-based roof shingles, tar paper, felts, and cement flashings;
- Window glazings and caulking;
- Pipe insulations;
- Asphalt pipe insulations;
- Tank mastic;
- Sink basin mastics;
- Boiler insulations;
- Boiler door insulations;
- Stair treads and associated mastics;
- Wood paneling mastics;
- Exterior tar paper behind shingles; and

The results of the ACM survey indicated the following types of materials were ACM:

- Black asphalt pipe insulation;
- White joint compound and associated wall boards;
- Window caulking and glazings;
- Floor tiles and associated mastic adhesives;
- Sink basin mastics;
- Boiler insulations;
- Asphalt roof shingles, felts, tars and flashings;
- Cementitious siding shingles and panels;
- White pipe insulation and associated mudded fittings;
- Wood panel mastic;
- Stair treads and associated mastics;
- Linoleum flooring;

Refer to the attached Smith & Wessel (Appendix B) report for detailed analytical results, an inventory of all suspect and identified ACM and an estimate of probable abatement costs. Because of the uncertainty of future building rehabilitation, Smith & Wessel have provided unit cost breakdowns per material type to assist in estimating future cost implications for asbestos abatement.

The analytical results of the black mastic beneath the floor tile in Building #106, the black mastic adhesive beneath the floor tile, yellow linoleum flooring and window glazing indicate trace amounts of asbestos. Further analysis using Transmission Electron Microscopy of these materials is recommended prior to disturbance.

Prior to renovation/demolition activities that will disturb ACM, a licensed Asbestos Abatement Contractor must remove the ACM in accordance with all federal, state and local regulations governing asbestos abatement work. Following removal of ACM from each work zone, a third party independent industrial hygiene firm must conduct clearance air monitoring in accordance with Massachusetts Department of Labor and Workforce Development regulations at 453 CMR, 6.14.

The Massachusetts Department of Environmental Protection allows building demolition with asbestos-containing asphaltic roofing materials and vinyl floor tiles, provided that the material is nonfriable and in good condition. All demolition debris generated must be disposed of at a construction debris landfill that will accept asbestos-containing asphaltic roofing materials/floor tiles commingled with demolition debris. In VHB's opinion, the asphalt-based roofing and flooring materials are not in good condition and must be removed prior to renovations to the roofing systems or demolition of the buildings.

#### **Lead-Based Paint (LBP)**

The lead inspection was performed in general accordance with a Massachusetts Department of Public Health regulations (MADPH 105 CMR, Part 460.000). The surface of each different painted building component from each of the 8 buildings was tested for total lead concentration. LBP was inspected to provide the renovation/demolition contractor(s) with information to take appropriate actions to protect employees (OSHA, 29 CFR, Part 1926.62, "Lead Exposure in Construction") and the environment (EPA, 40 CFR, Part 261, Subpart C, RCRA). Employees who are occupationally exposed to LBP at or above the OSHA Action Level of 30 micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) must receive hazardous waste training in accordance with OSHA, 29 CFR, Part 1910.120 ("Hazard Communication Standard"). Building components that leach lead at concentrations greater than 5 milligrams per Kilogram (mg/Kg), EPA's waste characterization threshold limit must be disposed as hazardous waste. Waste characterization of selected lead-based paint (LBP)-coated building materials was not performed as part of this survey, however, reasonable assumptions for waste characterization can be made from identifying total lead concentrations on specific types of substrates.

The interior and exterior surfaces of the 8 buildings were visually inspected for surfaces coated with paint to identify different colors of paint, approximate quantities of building components coated with paint, locations of the painted components, and potential sampling areas. A NITON Corporation (Model XL-309) was used to determine lead in paint concentrations during this inspection. The concentrations were reported as milligrams per square centimeter ( $\text{mg}/\text{cm}^2$ ) of surface area. The XRF uses a radioactive source that excites lead atoms when present. As the atoms return to their normal state, they emit x-rays that are characteristic of lead, if present. The XRF identifies and quantifies these x-rays to provide a lead concentration in  $\text{mg}/\text{cm}^2$  of surface area.

The EPA defines "lead hazardous waste" as waste materials that leach lead at greater than 5 mg/Kg when subject to toxicity characteristic leaching procedure (TCLP) testing. The purpose of the TCLP testing is to determine appropriate segregation and disposal requirements for LBP-coated building components. As a general industry rule, building components coated with LBP ( $> 1.0 \text{ mg}/\text{cm}^2$ ) that comprise greater than 5% of the demolition debris waste stream should be segregated prior to demolition and disposed as hazardous waste at an appropriate

landfill. For this reason, some buildings where LBP was identified do not require waste management because the LBP components do not comprise > 5% of the total waste stream. Once TCLP analysis determines that a singular building component leaches lead at concentrations greater than 5 mg/Kg, the building component must be managed as hazardous waste. (i.e. cannot be commingled with demolition debris).

The following types of building components were tested at the facility:

- Window casings;
- Walls;
- Baseboards;
- Cabinets
- Shelves;
- Ceilings
- Floors;
- Doors;
- Door casings;
- Exterior vestibules;
- Overhead garage doors;
- Exterior cornerboards;
- Exterior trim;
- Bathroom stall dividers;
- Chair rails;
- Vertical supports;
- Above-ground storage tanks;
- Ladders/railings;
- Stair treads, and hand rails; and

Detectable levels of lead (> 0.1 and <1.2 milligrams per square centimeter) were identified on several of these building components.

The following LBP-coated building components were identified:

- Exterior eaves;
- Sheet rock walls;
- Exterior trims;
- Exterior doors;
- Bathroom stall divider;

- Support columns and ladders;
- Concrete block walls; and
- Exterior vestibules.

LBP-coated components were identified in/on 7 of the 8 buildings; no LBP was detected in/on the Wastewater Treatment Plant. Refer to Attachment C for a complete list of XRF field testing results and inventory of LBP identified.

Estimates for probable abatement (Attachment D) were developed for interior materials only. For the purposes of this report, we have assumed that all the buildings will be demolished. For this reason, no cost estimates have been provided for rehabilitation of interior or exterior surfaces coated with LBP.

#### **OIL AND OTHER HAZARDOUS MATERIALS (OHM)**

A survey for miscellaneous containers of oil and/or hazardous materials (OHM) was performed in order to identify all regulated and special wastes that would require removal prior to building demolition. VHB identified several types of OHM at the 8 buildings. The majority of the OHM identified were miscellaneous containers used for cleaning/housekeeping or vehicle maintenance operations. In addition to the miscellaneous containers, the following OHM were identified:

- Mercury-containing thermostat ampules;
- Mercury-containing fluorescent light tubes;
- PCB-containing light ballasts and starters;
- Fuel oil aboveground storage tanks (ASTs);
- 55-gallon drum of fuel oil;
- Cathode Ray Tubes (CRTs);
- Chlorofluorocarbon (CFC)-containing air conditioners and refrigeration equipment;
- Automobile tires; and
- Dry chemical fire extinguishers.

Reports previously reviewed by VHB in November 1999, which were provided by National Parks Service, indicate all transformers not labeled "No PCBs" have been tested for PCB's and determined to be PCB free (Radian Corporation, November 1994).

Although the pre-demolition survey was limited to the buildings, other miscellaneous OHM were observed on the Site that the National Park Service should note. These included utility poles potentially coated with creosote and a demolition waste pile located behind Building #34. VHB observed a contractor removing the demolition debris pile at the time of the survey. The estimates of probable abatement reflect this understanding. VHB recommends that:

- All OHM located at the buildings should either be relocated/reused or properly recycled or disposed prior to demolition.
- All of the materials that are not reused must be properly removed, transported and recycled/disposed by licensed contractors following all applicable federal, state, and local regulations.
- Utility poles discarded in front of Building #34 should be treated as special waste due to the potential of wood preservatives (creosote/pentachlorophenol).
- Prior to off-site management, refrigeration equipment/compressors (CFC's), internal engine lubricating oils (PCBs), and all motorized equipment (oils) should be tested for the presence of hazardous/regulated materials. If any hazardous or regulated materials are detected, they must be managed (recycled/recaptured/disposed) in accordance with all federal, state and local regulations.

Please call me at 617-924-1770 extension 1243 or Doug Burgess at extension 1509, if you have any questions.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Timothy M. Downey  
Hazardous Materials Specialist

Alan D. Hanscom, P.E., L.S.P.  
Director of Environmental  
Engineering

Attachments

- A Limitations
- B Smith & Wessel Associates, Inc. Asbestos Survey Report
- C Results of XRF Field Results
- D Estimates of Probable Abatement

cc: Doug Burgess, VHB

## APPENDIX A - LIMITATIONS

### *8 Buildings*

#### *Former North Truro Air Force Station*

##### *North Truro, Massachusetts*

- This report has been prepared for the sole and exclusive use of Bargmann Hendrie + Archetype ("Client"), on behalf of the National Park Service, and is subject to and issued in connection with the Agreement and the provisions thereof. Any use or reliance upon information provided in this report, without the specific written authorization of Client and VHB, shall be at User's sole risk.
- In conducting this assessment, VHB has obtained and relied upon laboratory analytical results from SciLab Boston, Inc. This information was used to form conclusions regarding the types and quantities of ACM that must be managed prior to demolition of the building.
- No attempt has been made to assess the compliance status of any past or present Owner or Operator of the subject property with any federal, state or local laws or regulations.
- The findings, observations and conclusions presented in this report are limited by the scope of services outlined in our Agreement, which reflects schedule and budgetary constraints for the current phase of the assessment. Furthermore, the assessment has been performed in accordance with generally accepted engineering practices. No other warranty, expressed or implied, is made.
- The assessment presented in this report is based solely upon information gathered to date. Should further environmental or other relevant information be developed at a later date, Client should bring the information to the attention of VHB as soon as possible. Based upon an evaluation, VHB may modify the report and its conclusions.



# ESTIMATES OF PROBABLE ABATEMENT FORMER NORTH TRURO AIR FORCE STATION NORTH TRURO, MASSACHUSETTS

LOCATION	WASTE TYPE	BASIS FOR ESTIMATE	COST ESTIMATE
Building #7	ACM	Complete removal and hygiene testing	\$7,425
	LBP	Disposal of concrete block & wood eave	\$2,500*
	OHM	Complete recycling/removal/reuse	\$2,000
			<b>TOTAL=\$11,925</b>
Building #19	ACM	Complete removal and hygiene testing	\$31,470
	LBP	Commingle small quantity of wood	\$0*
	OHM	Drum testing/complete recycling/removal/reuse	\$2,000
			<b>TOTAL=\$33,470</b>
Building #32	ACM	Complete removal and hygiene testing	\$24,100
	LBP	Disposal of wood eaves and windows	\$2,500*
	OHM	Complete recycling/removal/reuse	\$1,000
			<b>TOTAL=\$27,600</b>
Building #34	ACM	Complete removal and hygiene testing	\$25,750
	LBP	Disposal of wood eave	\$2,000*
	OHM	Complete recycling/removal/reuse	\$3,000
			<b>TOTAL=\$30,750</b>
Building #38	ACM	Complete removal (including roof) and hygiene testing	\$75,320
	LBP	Interior abatement only	\$500*
	OHM	Complete recycling/removal/reuse	\$500
			<b>TOTAL=\$76,320</b>
Building #46	ACM	Complete removal and hygiene testing	\$3,600
	LBP		\$2,500*
	OHM	Complete recycling/removal/reuse	\$100
			<b>TOTAL=\$6,200</b>
Building #106	ACM	Complete removal and hygiene testing	\$25,560
	LBP	Disposal of wood foyers	\$100*
	OHM	Complete recycling/removal/reuse	\$500
			<b>TOTAL=\$26,160</b>

Note: All estimates based on demolition of buildings. Costs are based on Contractor performing all work in one mobilization.

\* Cost assumes material will be disposed in one common hazardous waste dumpster located on-site.

**ESTIMATES OF PROBABLE ABATEMENT  
FORMER NORTH TRURO AIR FORCE STATION  
NORTH TRURO, MASSACHUSETTS**

LOCATION	WASTE TYPE	BASIS FOR ESTIMATE	COST ESTIMATE
Building #107			
	ACM	Complete removal and hygiene testing	\$34,205
	LBP	Disposal of wood foyer	\$100*
	OHM	Complete recycling/removal/reuse	\$500
			<b>TOTAL=\$34,805</b>

Note: All estimates based on demolition of buildings. Costs are based on Contractor performing all work in one mobilization.

\* Cost assumes material will be disposed in one common hazardous waste dumpster located on-site.

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## **IV. Individual Building Survey Forms**

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